

Mediencafé, 26. April 2017

INFORMATIK QUERGEDACHT

Eckart Zitzler, mit Zeichnungen von Susanne Staubli

PHBern

Informatik = automatisierte Informationsverarbeitung

Algorithmus

Eingabe

Objekt

Modell

Ausgabe

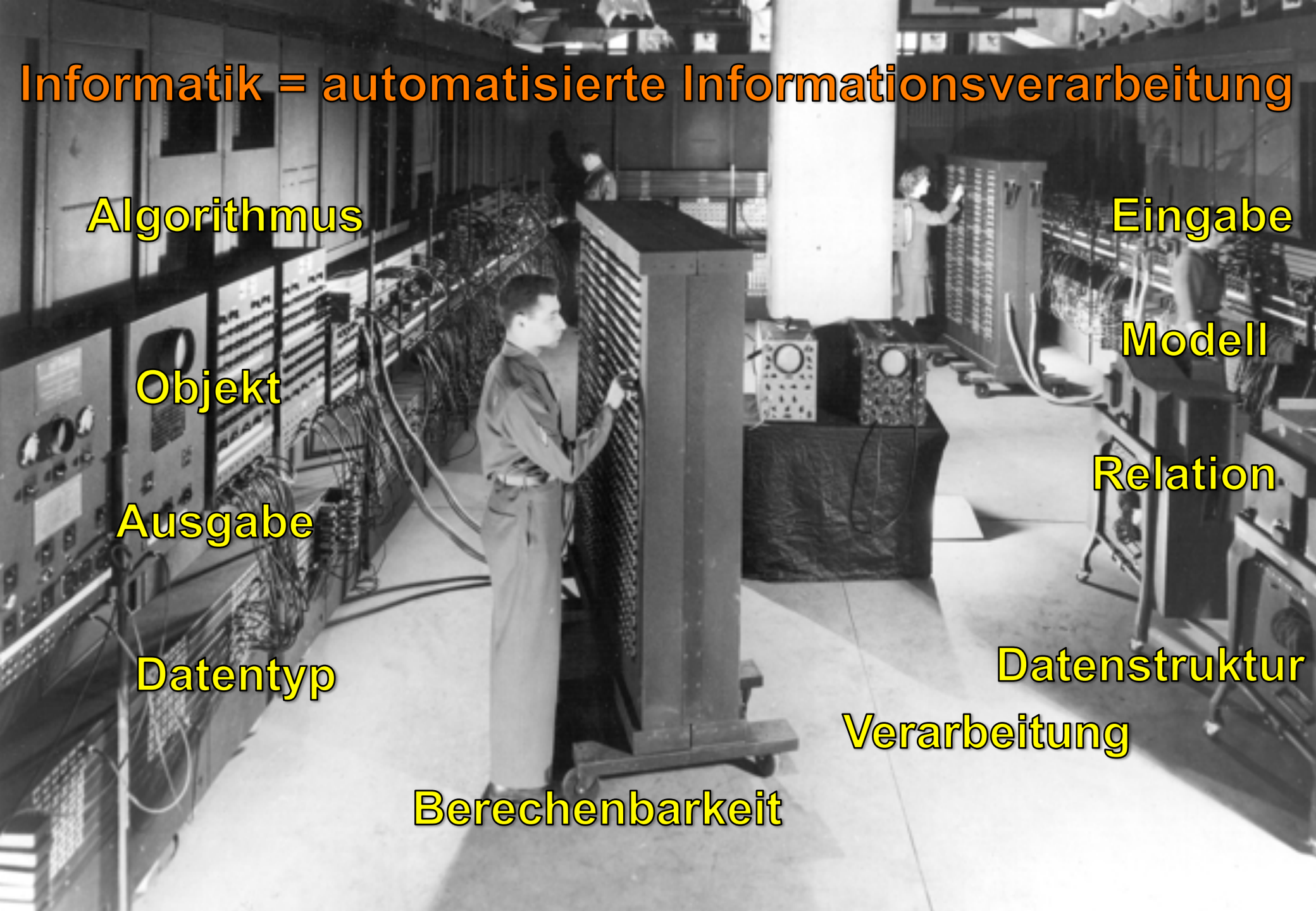
Relation

Datentyp

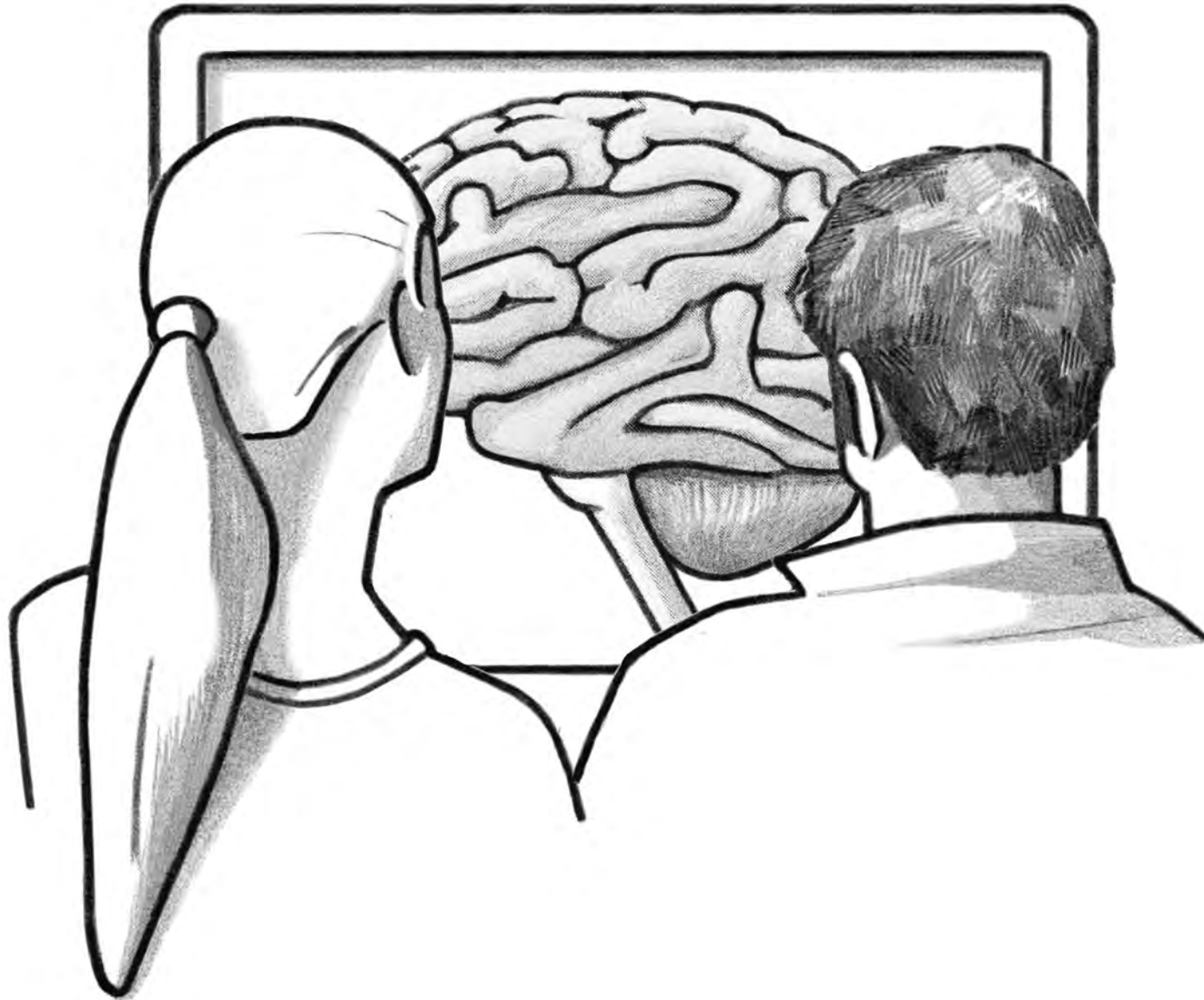
Datenstruktur

Verarbeitung

Berechenbarkeit



Der Informatik ins Hirn schauen



What is Computer Science? (cont.)

- **Mathematics:** *“The queen and servant of sciences”*
- **Queen:** Power, authority, pride
- **Servant:** Influences and transforms by being useful, powerful, and universal
- **My point:** CS is the new math



LOGICOMIX



AN EPIC SEARCH FOR TRUTH

APOSTOLOS DOXIADIS AND CHRISTOS H. PAPADIMITRIOU

ART BY ALECOS PAPADATOS AND ANNIE DI DONNA





David Hilbert (1900):

Ist Mathematik

- vollständig
- widerspruchsfrei
- entscheidbar?

Kurt Gödel: nein

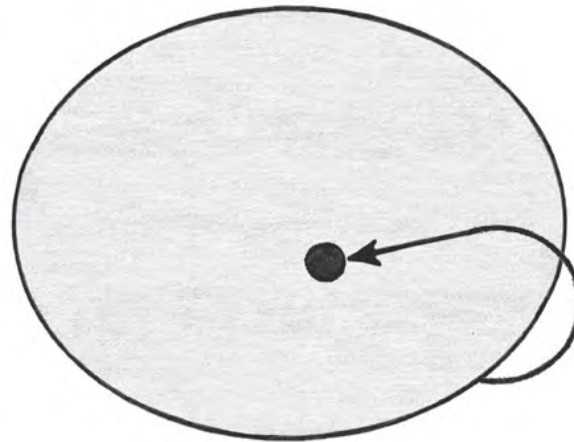


Paradoxon des Epimenides



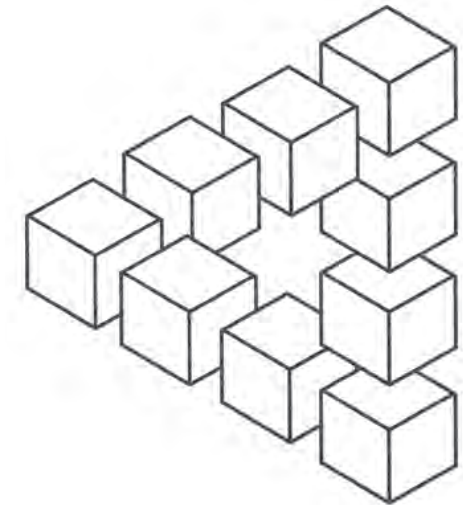
Ihr Buchautor

Russellsche Antinomie



Enthält die Menge aller Mengen, die sich nicht selbst als Element enthalten, sich selbst?

Penrose-Dreieck

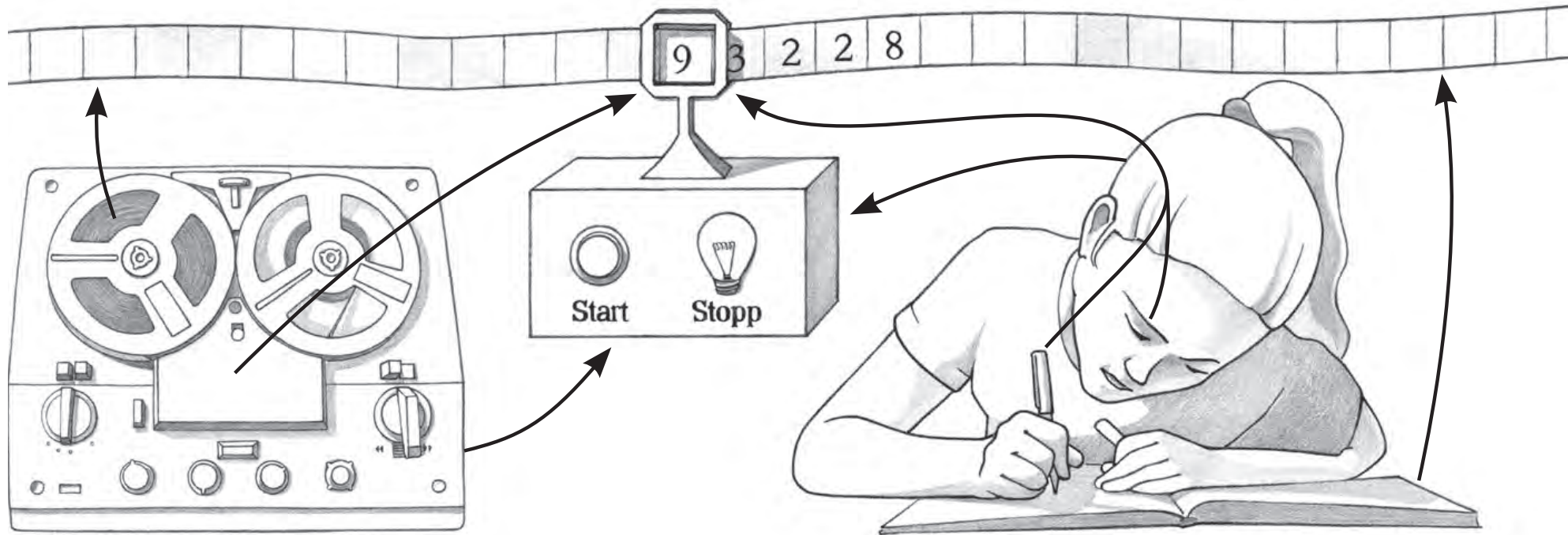
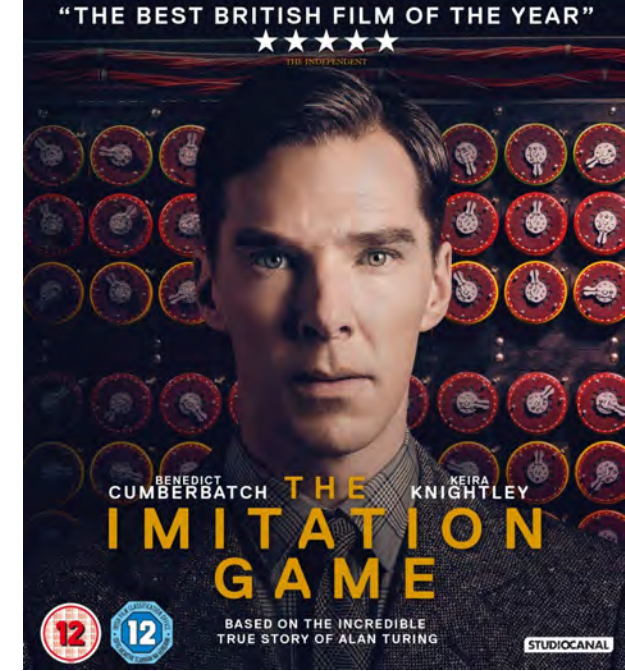


unmögliche Figur

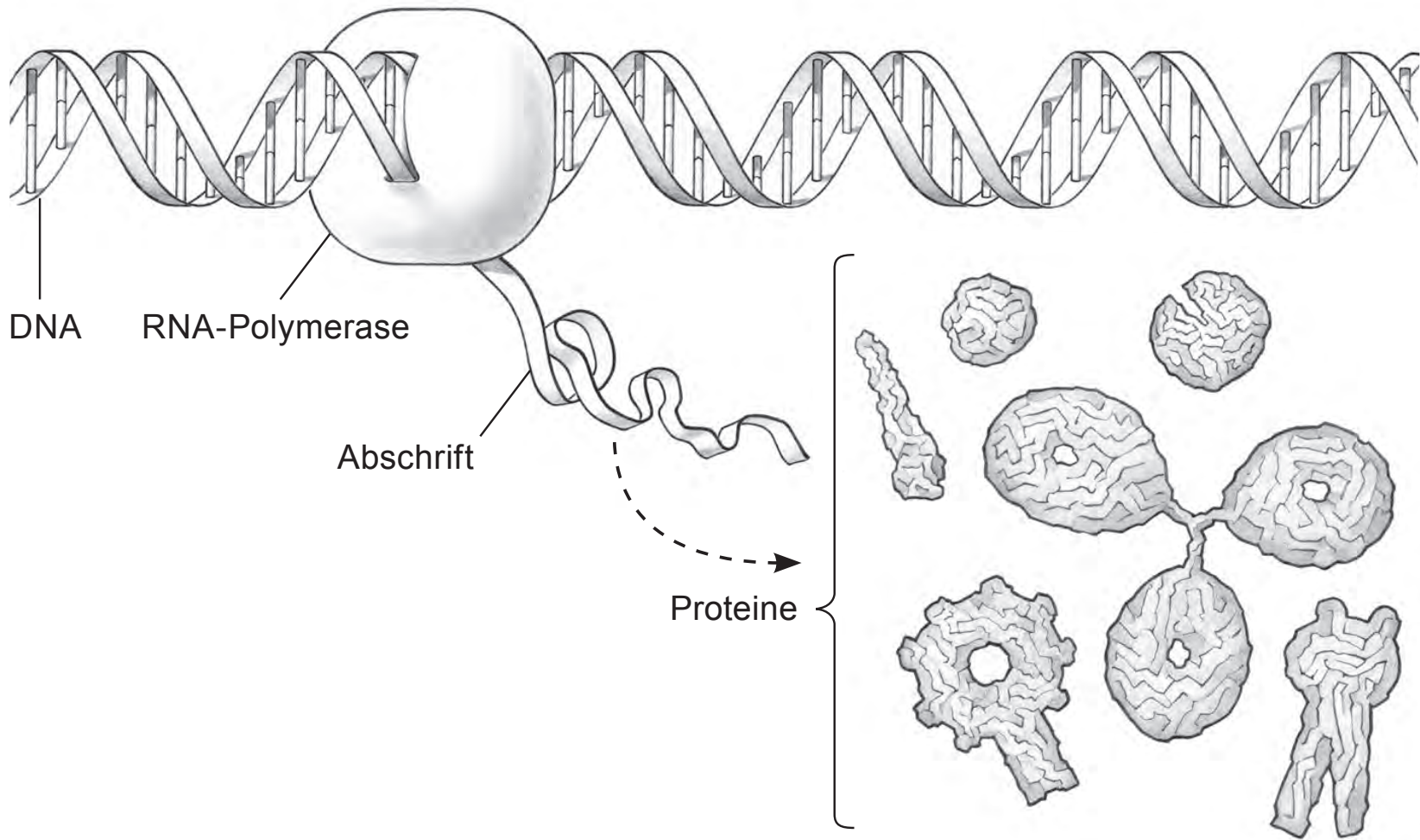
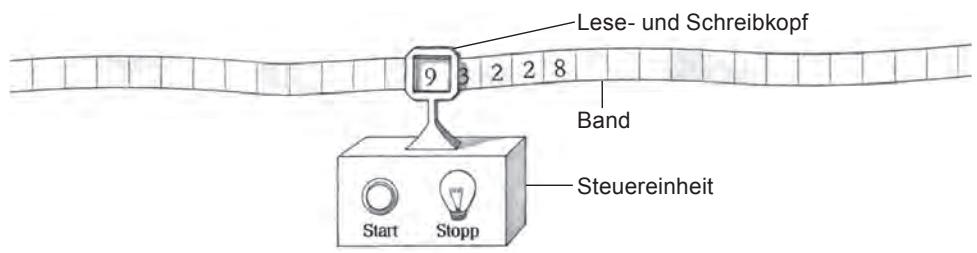


Alan Turing (1936):

Was ist Denken,
was ist Rechnen?



Die Turing-Maschine in der Zelle

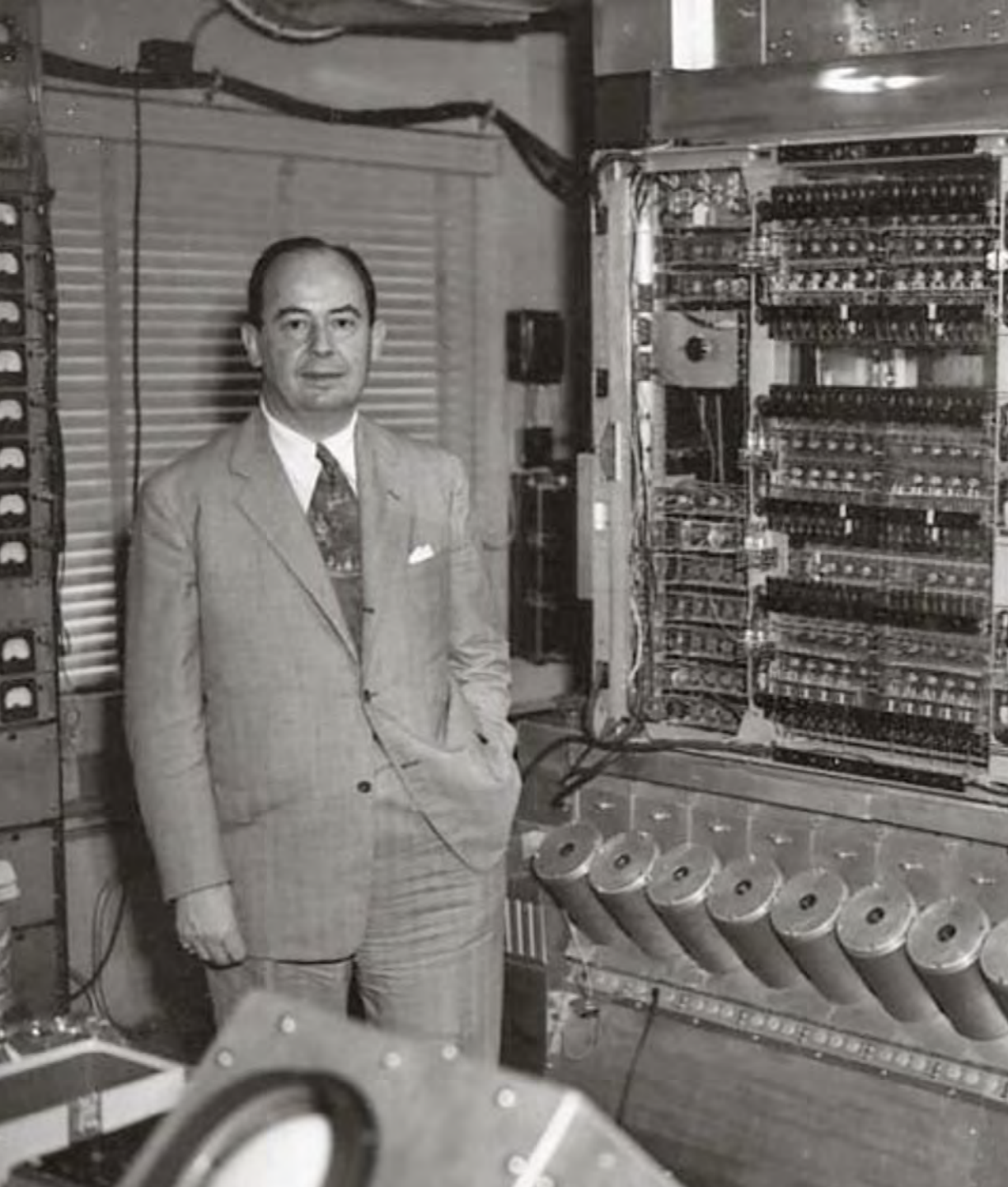


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11110100100000001110101010110101001010001111000001010100100
10101000111111111011110111101111110111011111011110111010101
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11110100100000001110101010110101001010001111000001010100100
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10100100100101010010001000100100100110001001001000000000100
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11110100100000001110101010110101001010001111000001010100100

digital

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digital ist natürlich



John von Neumann

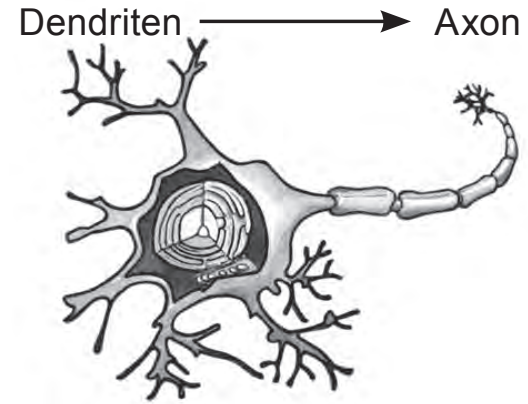
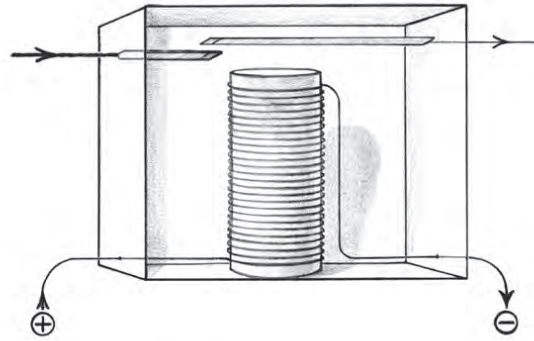
Die Rechen- maschine und das Gehirn

Scientia
Nova

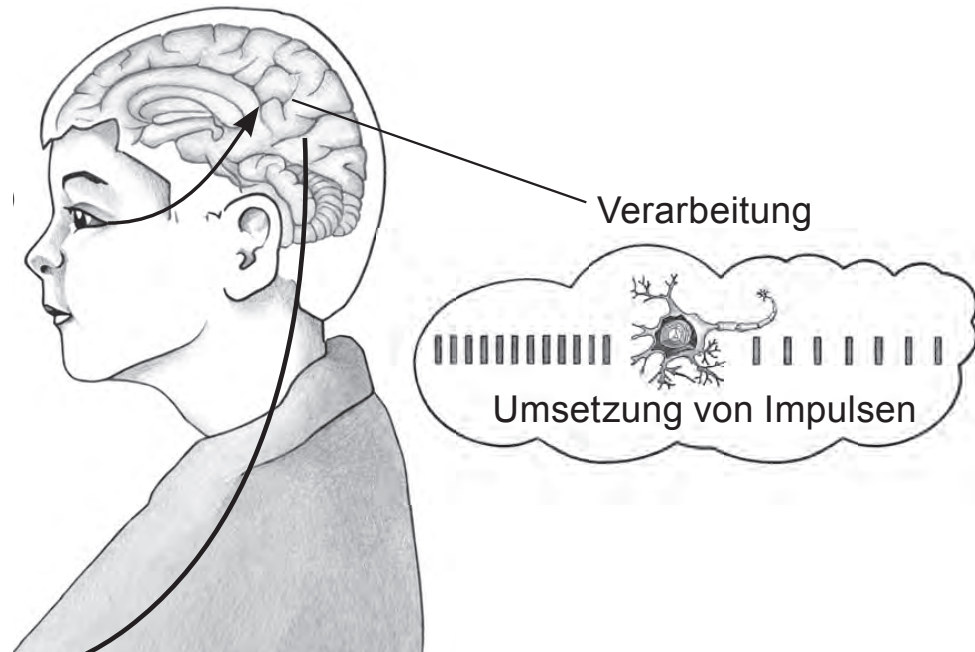
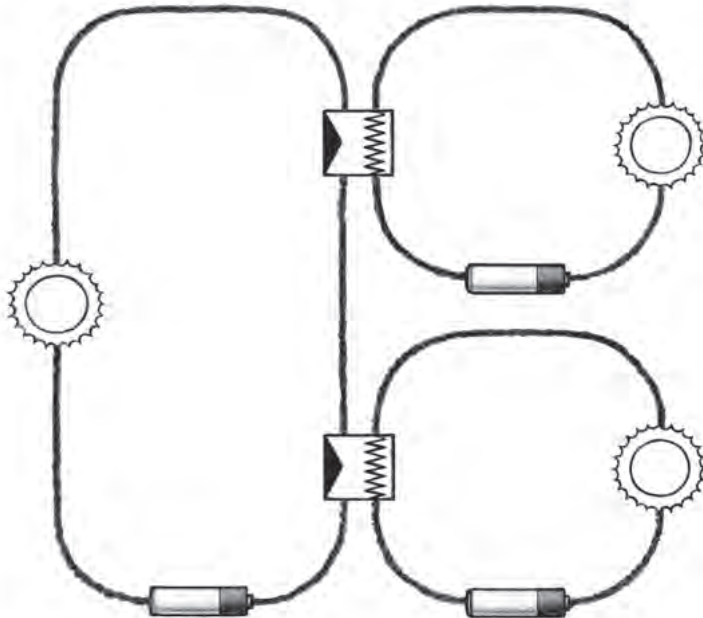
Oldenbourg



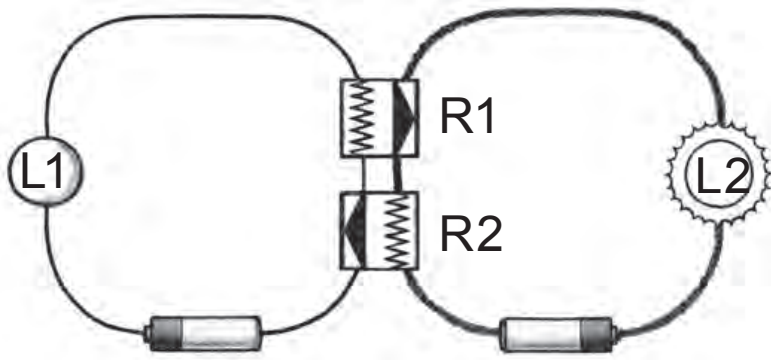
schließendes Relais



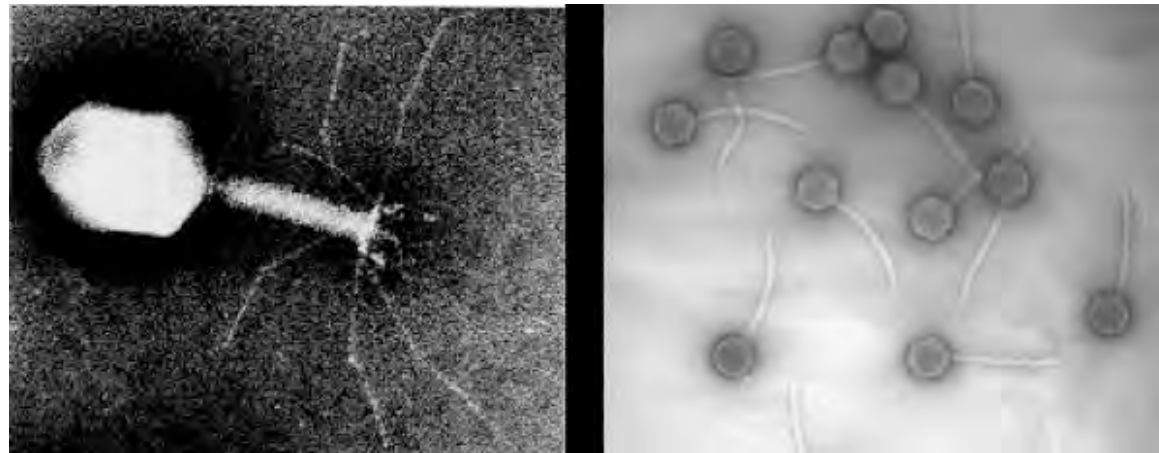
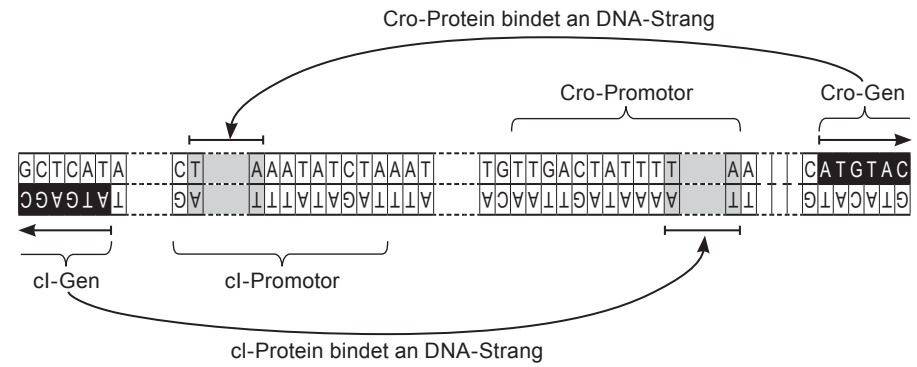
Schalter: kleines Ding, grosse Wirkung

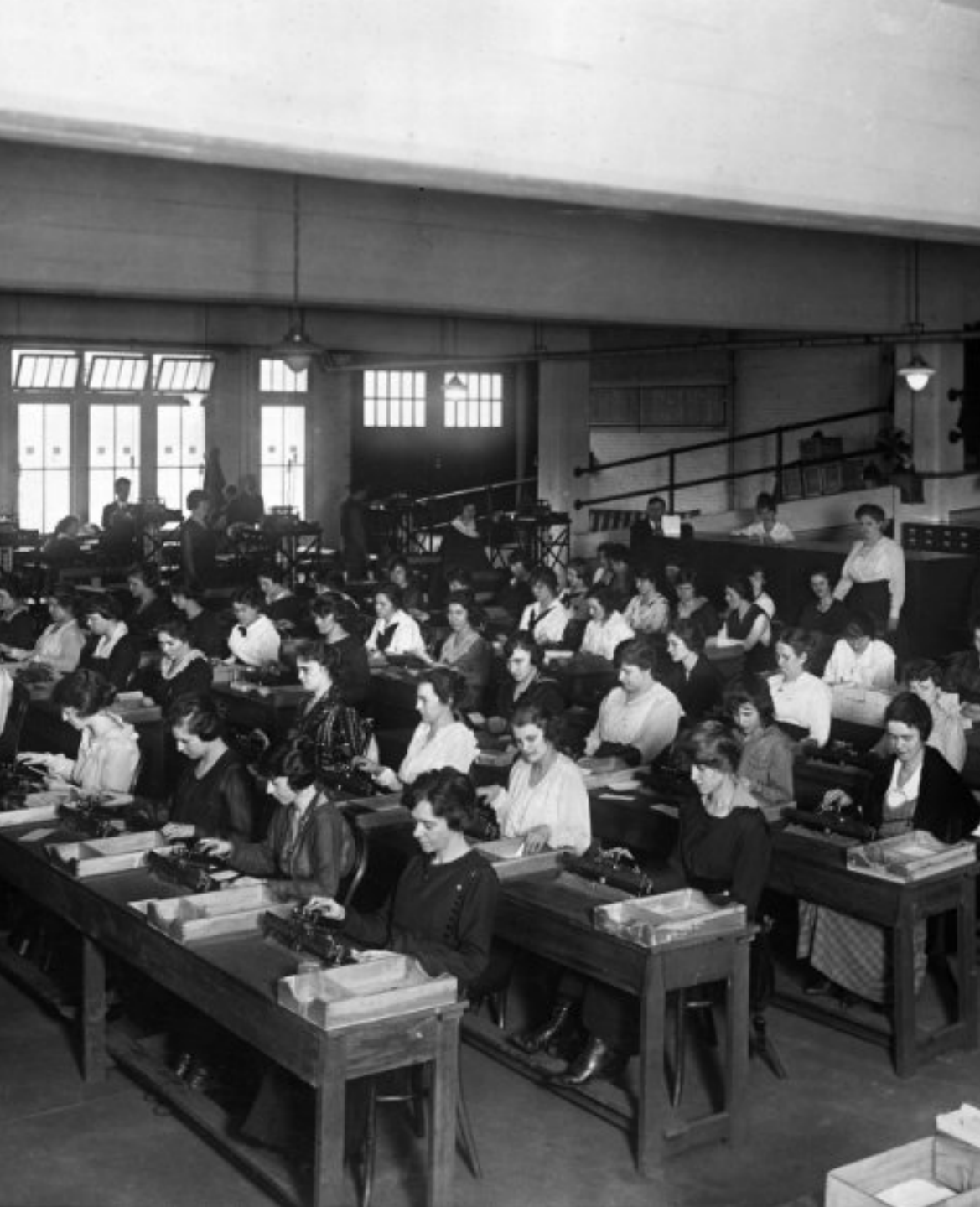


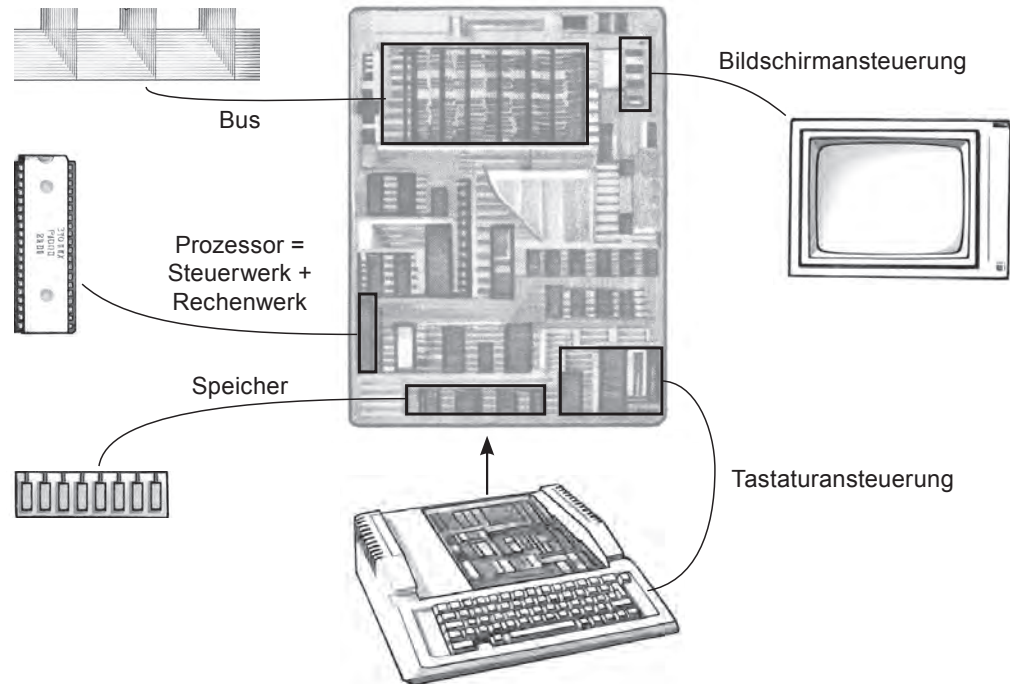
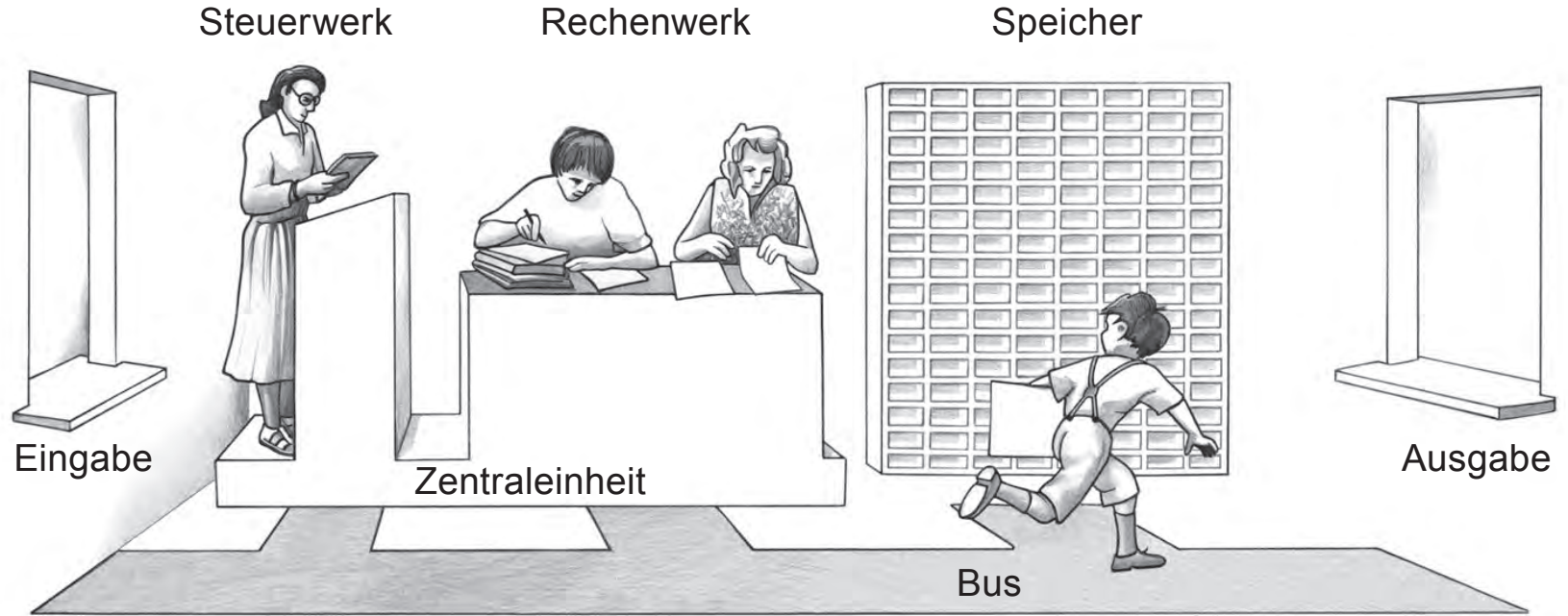
Flipflop: Vom Computerspeicher zum Virus



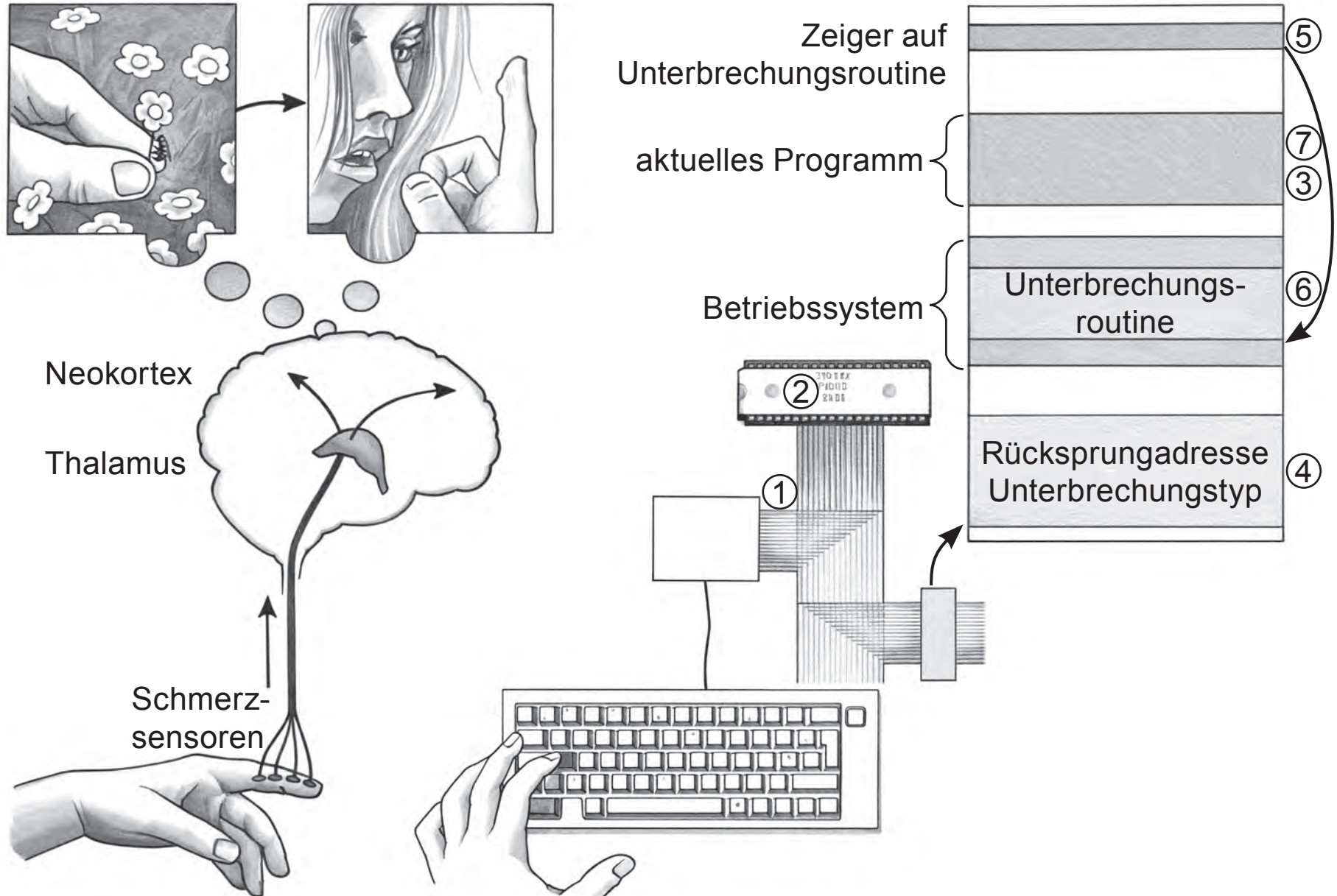
Stromkreis 1 Stromkreis 2







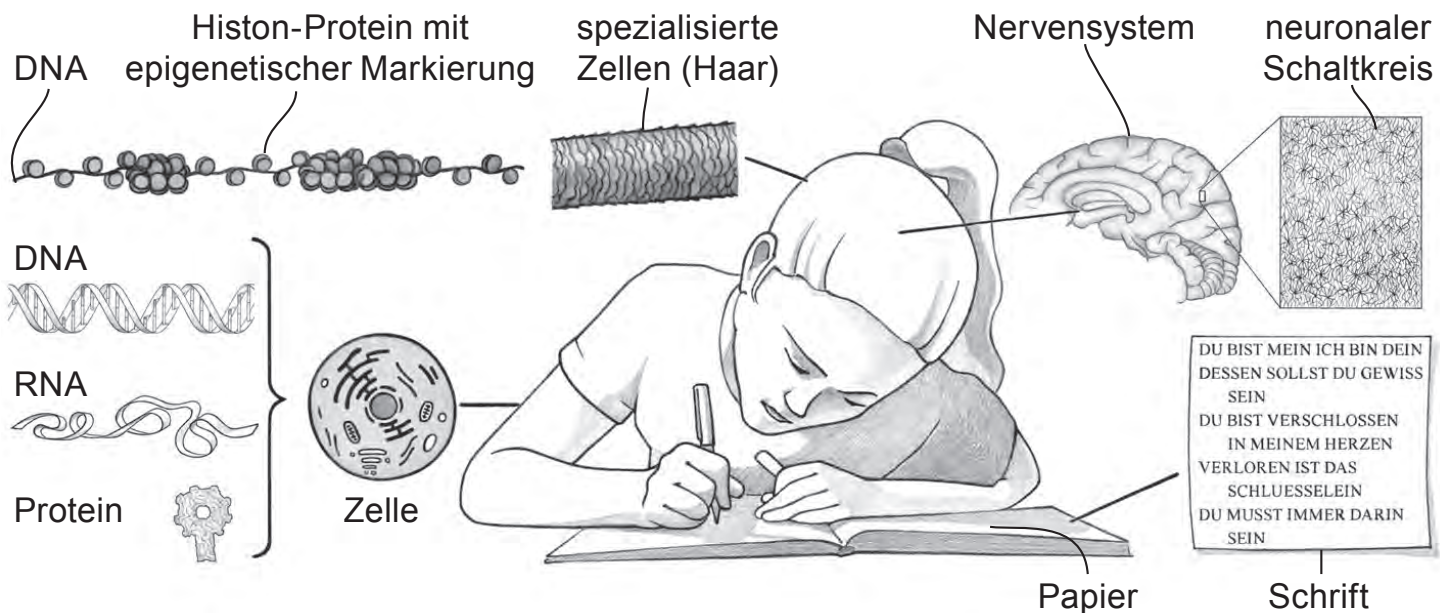
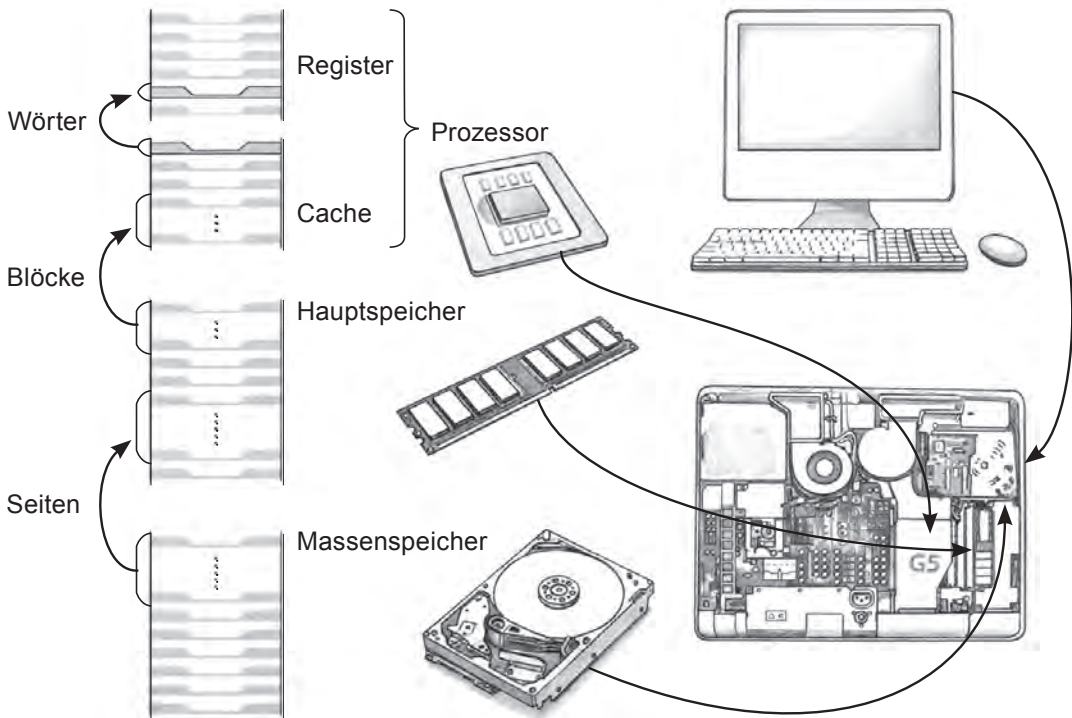
Vom aktiven zum passiven Warten: Unterbrechungen

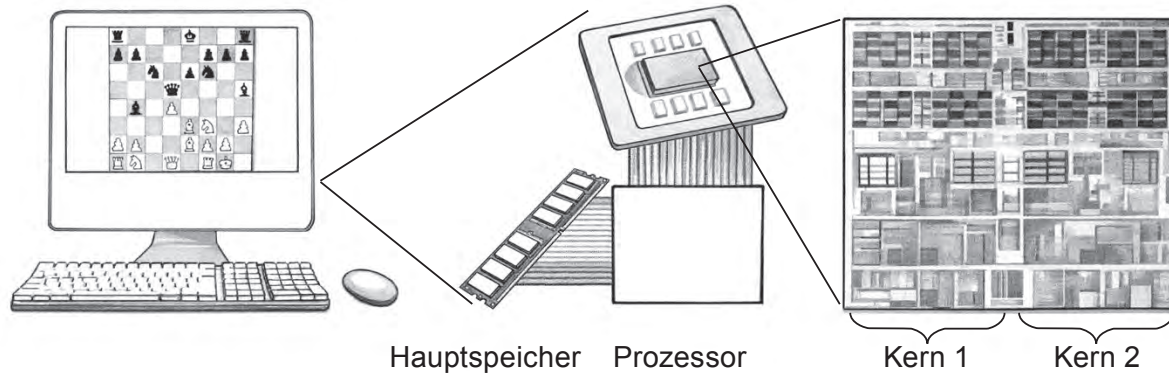


Franz Hohler demonstriert Informatik



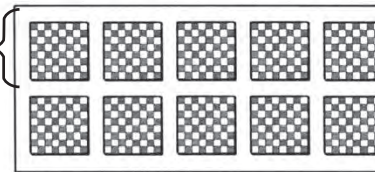
Stufen von Speichertechnologien





Züge ermitteln

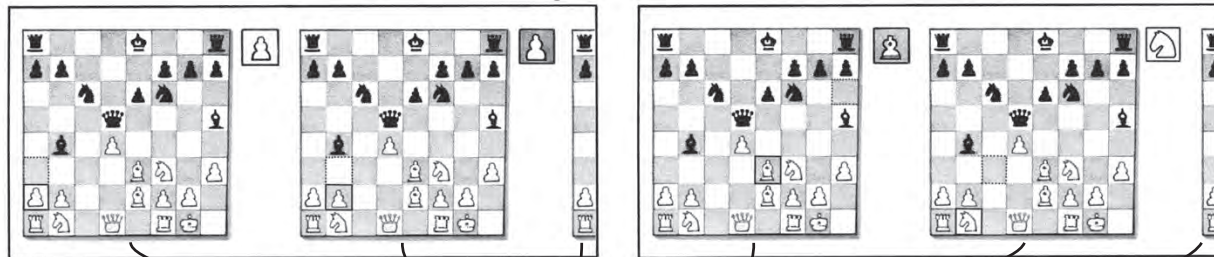
Kern 1



Kern 1

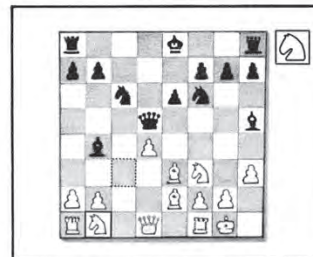
Züge bewerten

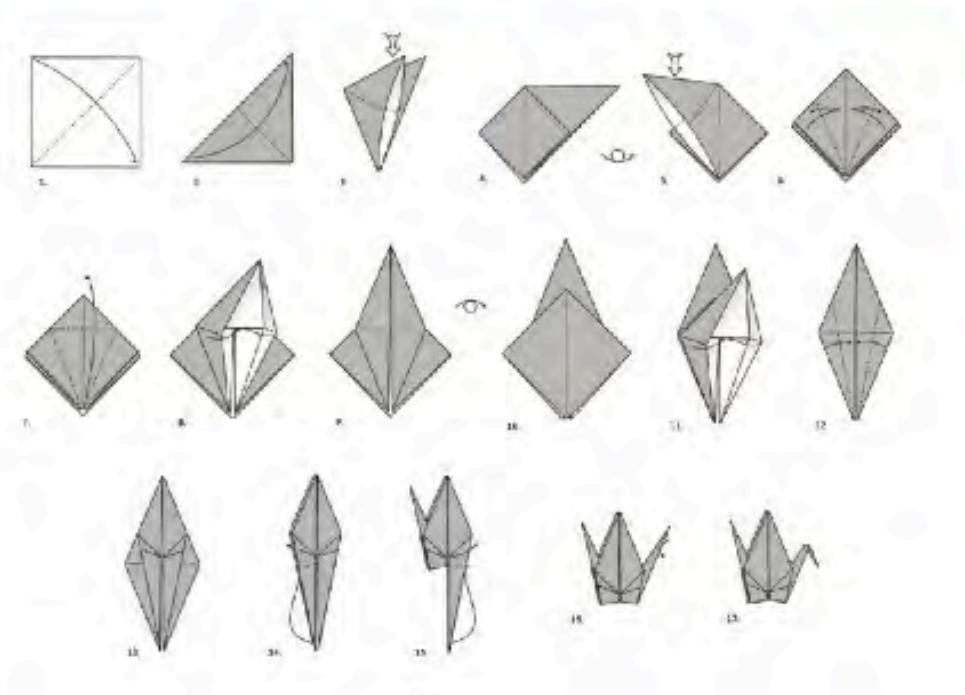
Kern 2



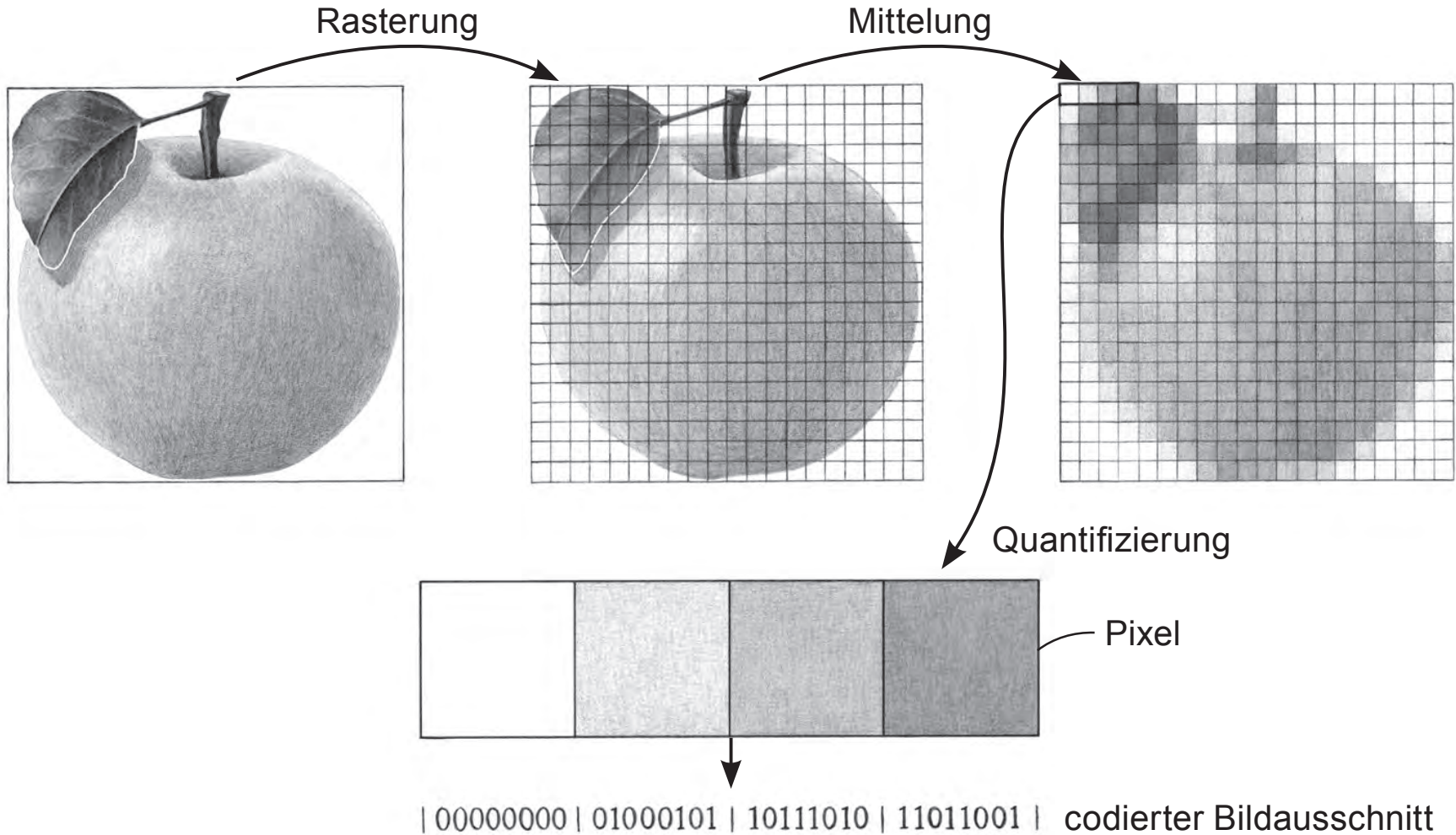
Zug bestimmen

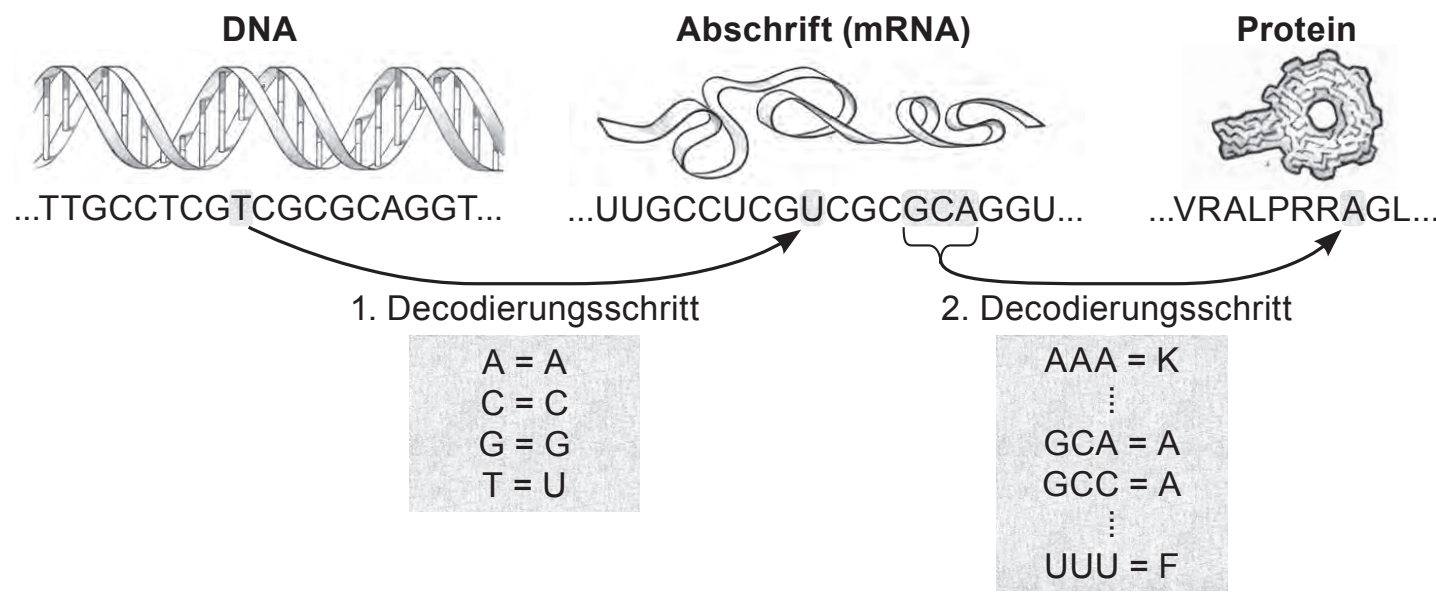
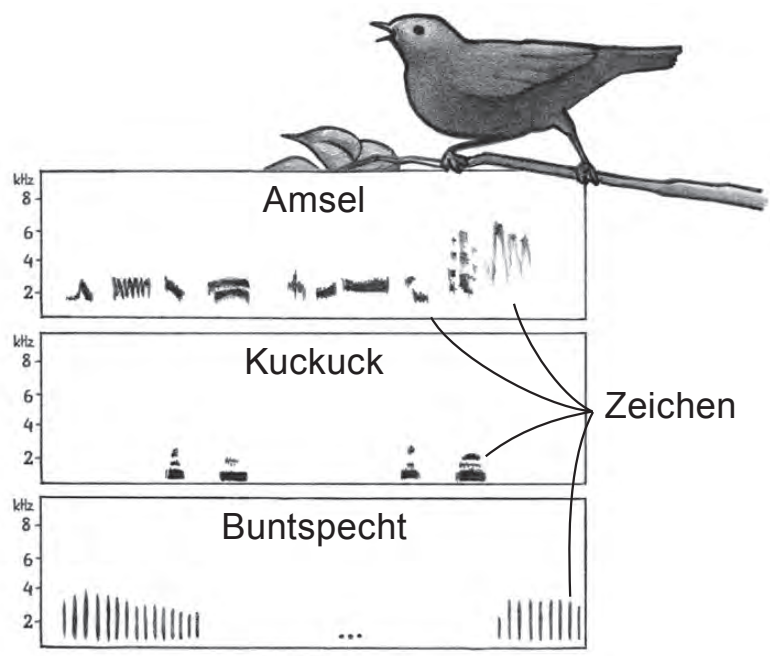
Kern 1





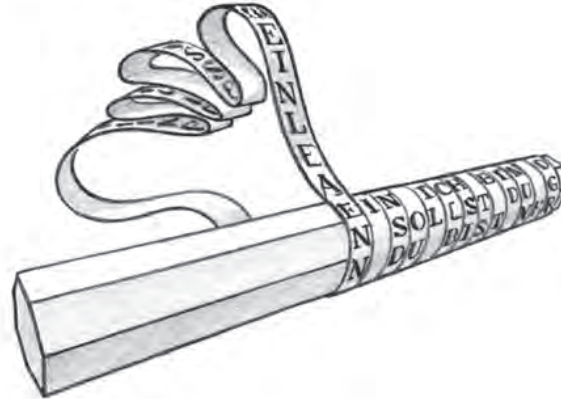
Codes = die Kunst der Darstellung







Skytale



unverschlüsselte Botschaft
(Klartext)

Chiffrierung

verschlüsselte Botschaft
(Geheimtext)

DU BIST MEIN ICH BIN DEIN
DESSSEN SOLLST DU GEWISS
SEIN
DU BIST VERSCHLOSSEN
IN MEINEM HERZEN
VERLOREN IST DAS
SCHLUESSELEIN
DU MUSST IMMER DARIN
SEIN



Chiffrierscheibe

GX ELVW PHLQ LFK ELQ GHLQ
GHVVHQ VROOVQ GX JHZLVV
VHLK
GX ELVW YHUVFKORVVHQ
LQ PHLQHP KHUCHQ
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VFKOXHVVOHLQ
GX PXVVW LPPHU GDULQ
VHLQ

Klartext

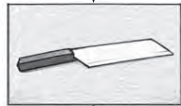
DU BIST MEIN ICH BIN DEIN
DESSEN SOLLST DU GEWISS
SEIN
DU BIST VERSCHLOSSEN
IN MEINEM HERZEN
VERLOREN IST DAS
SCHLUESSELEIN
DU MUSST IMMER DARIN
SEIN

Chiffrierschlüssel



64-Bit-Block

010... // ...101



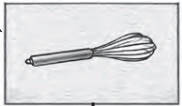
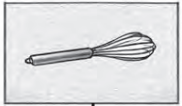
64-Bit-Block

111... // ...011



sechzehn
Wiederholungen

001...10 | 101...01



sechzehn
Wiederholungen

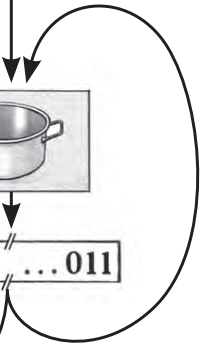
011...01 | 001...11

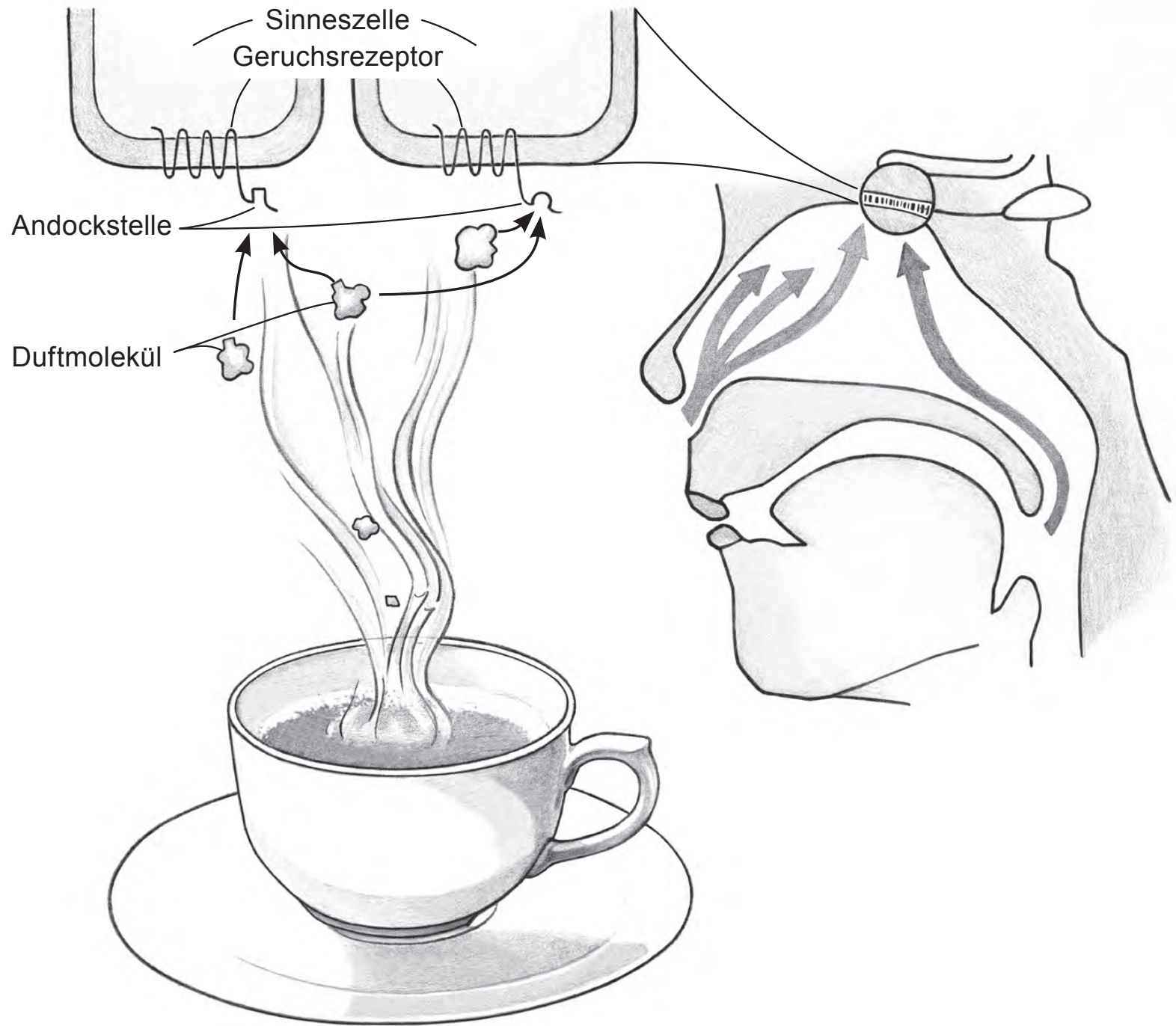
011... // ...111

64-Bit-Block

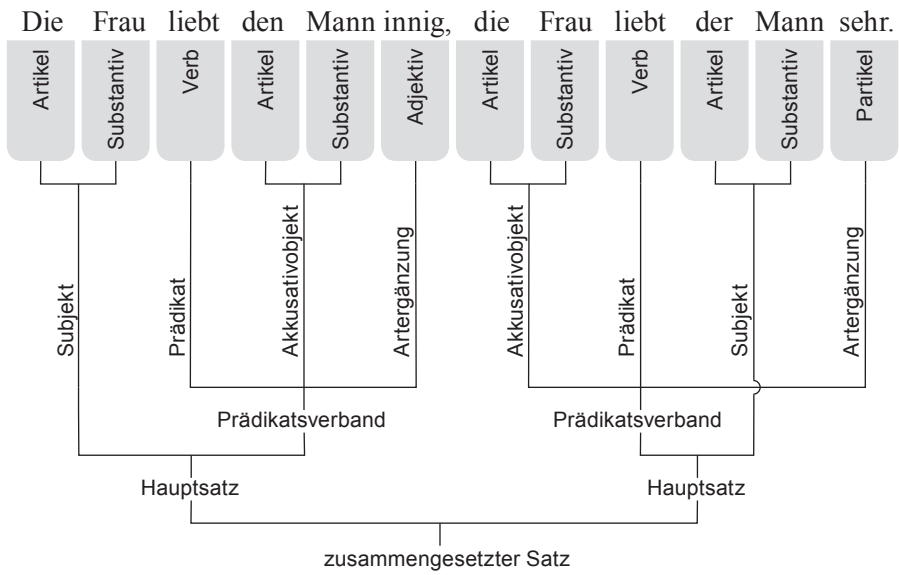
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GHVVHQ VROOVQ GX JHZLVV
VHLK
GX ELVW YHUVFKORVVHQ
LQ PHLQHP KHUCHQ
YHUORUHQ LVW GDV
VFKOXHVVOHLQ
GX PXVVW LPPHU GDULQ
VHLQ

Geheimtext







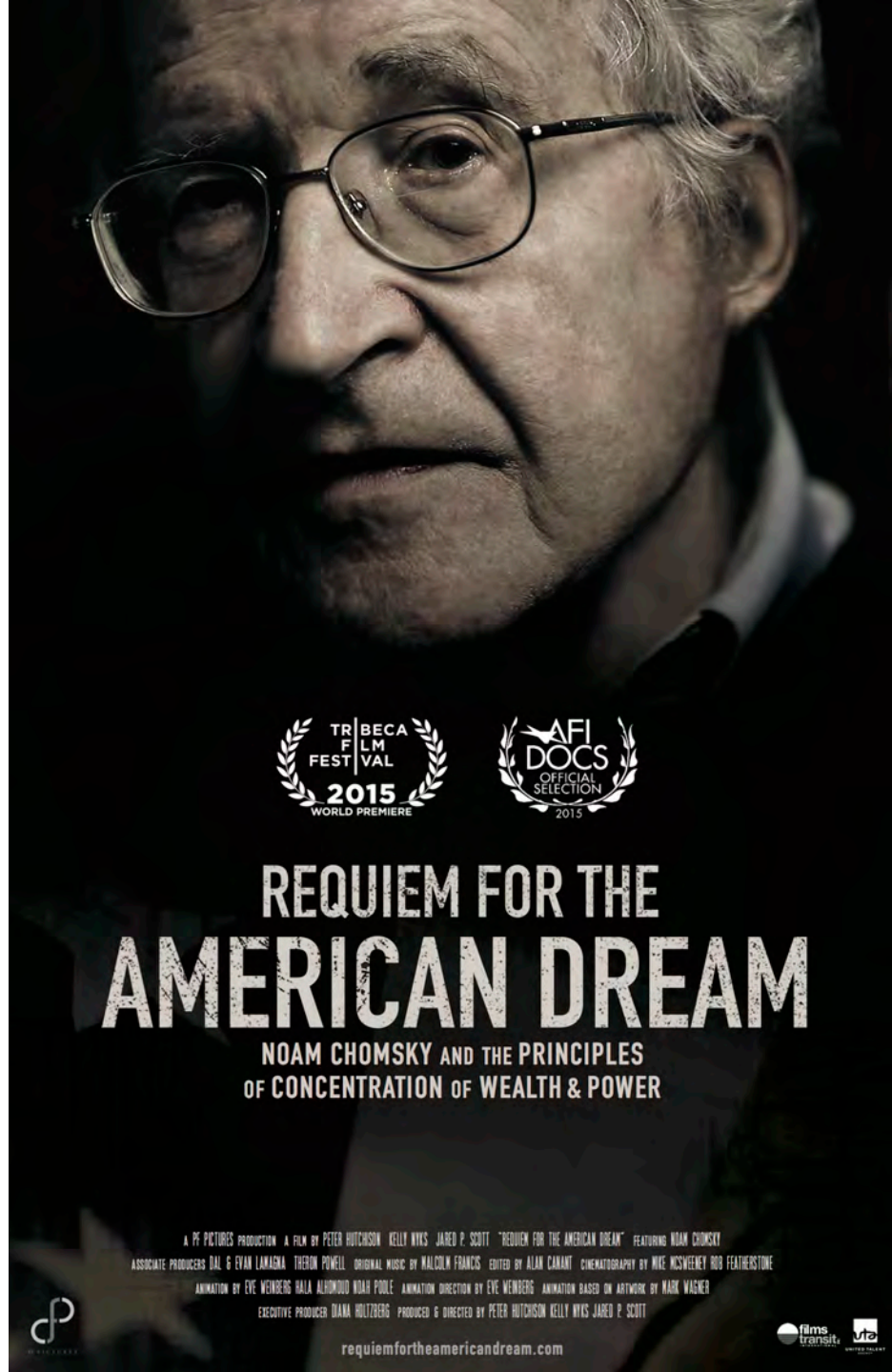


Linguistik prägt Informatik

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Typ-1 kontextsensitive Grammatik			0	<input type="checkbox"/>	1	→	0	<input type="checkbox"/>	<input type="checkbox"/>	1	
Typ-2 kontextfreie Grammatik					<input type="checkbox"/>	→	0	<input type="checkbox"/>	1	<input type="checkbox"/>	1
Typ-3 reguläre Grammatik					<input type="checkbox"/>	→	<input type="checkbox"/>	0			

Nichtterminalsymbole = Platzhalter

0 1 Terminalsymbole = Zeichen aus Alphabet



REQUIEM FOR THE AMERICAN DREAM

NOAM CHOMSKY AND THE PRINCIPLES OF CONCENTRATION OF WEALTH & POWER

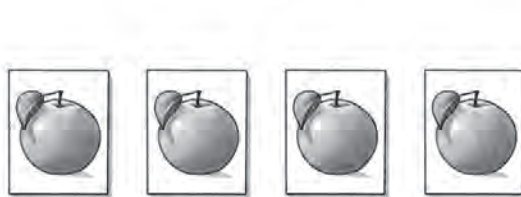
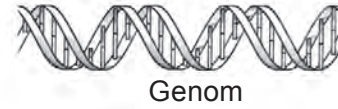
A PF PICTURES PRODUCTION A FILM BY PETER HUTCHISON KELLY NYKS JARED P. SCOTT "REQUIEM FOR THE AMERICAN DREAM" FEATURING NOAM CHOMSKY
 ASSOCIATE PRODUCERS DAL G EVAN LAMASNA THERON POWELL ORIGINAL MUSIC BY MALCOLM FRANCIS EDITED BY ALLAN CANANT CINEMATOGRAPHY BY MIKE MCSWEENEY BOO FEATHERSTONE
 ANIMATION BY EYE WEBBERG HALLA ALIHOVUD NOAH POOLE ANIMATION DIRECTION BY EYE WEBBERG ANIMATION BASED ON ARTWORK BY MARK WAGNER
 EXECUTIVE PRODUCER DIANA HOLTZBERG PRODUCED & DIRECTED BY PETER HUTCHISON KELLY NYKS JARED P. SCOTT



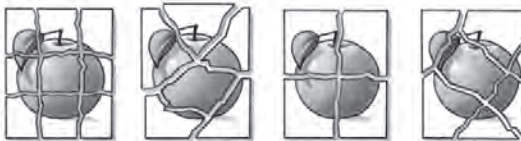
requiemfortheamericandream.com



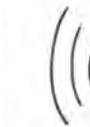




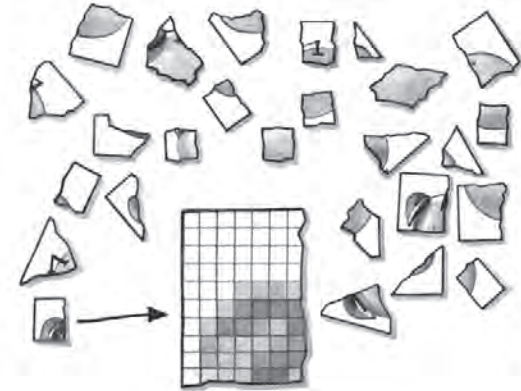
① vervielfältigen



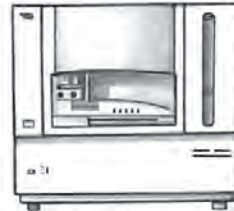
② fragmentieren



Ultraschall

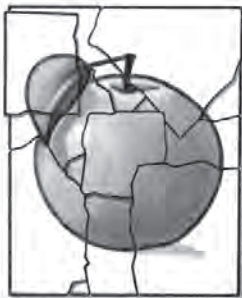


③ sequenzieren



Sequenziermaschine

ACCTGA TGCC AATCCTC
ACC TGATG CCAAT CCTC
ACCTGAT G CCAATCCTCA
ACCTGATG CCAATC CTCA

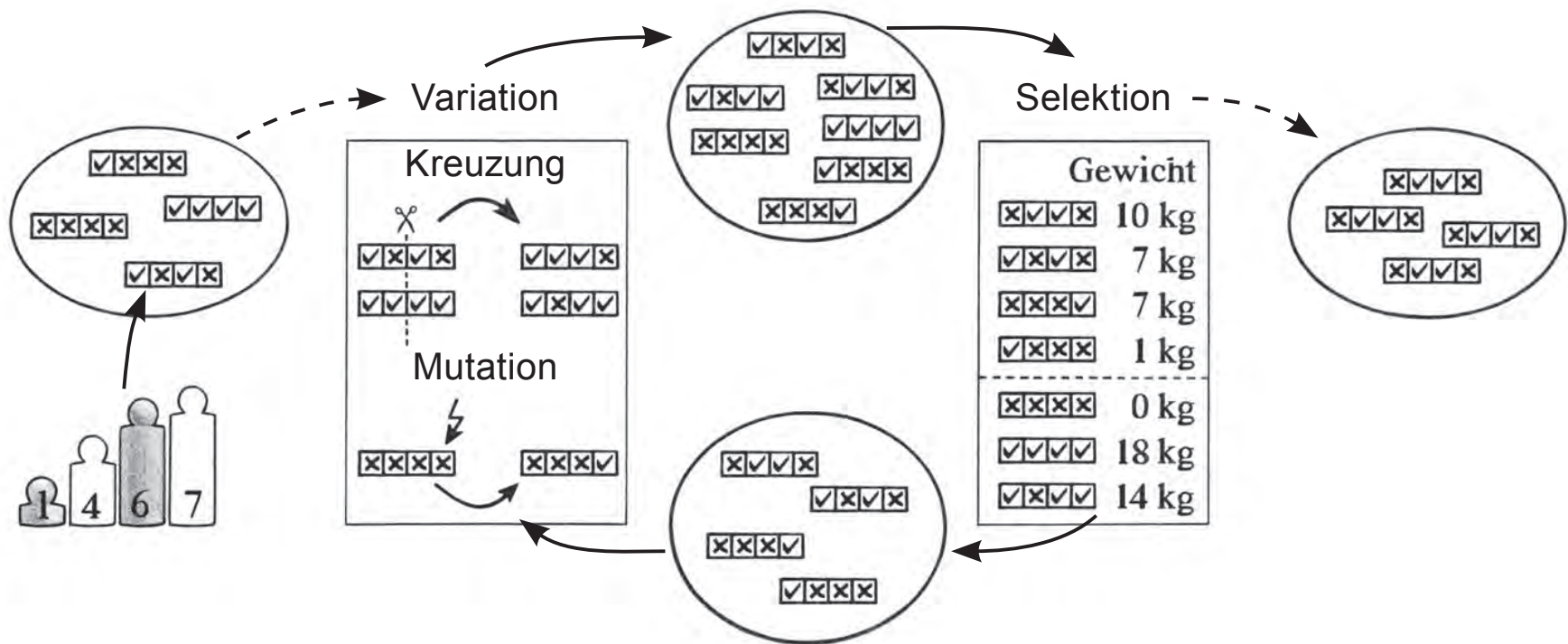
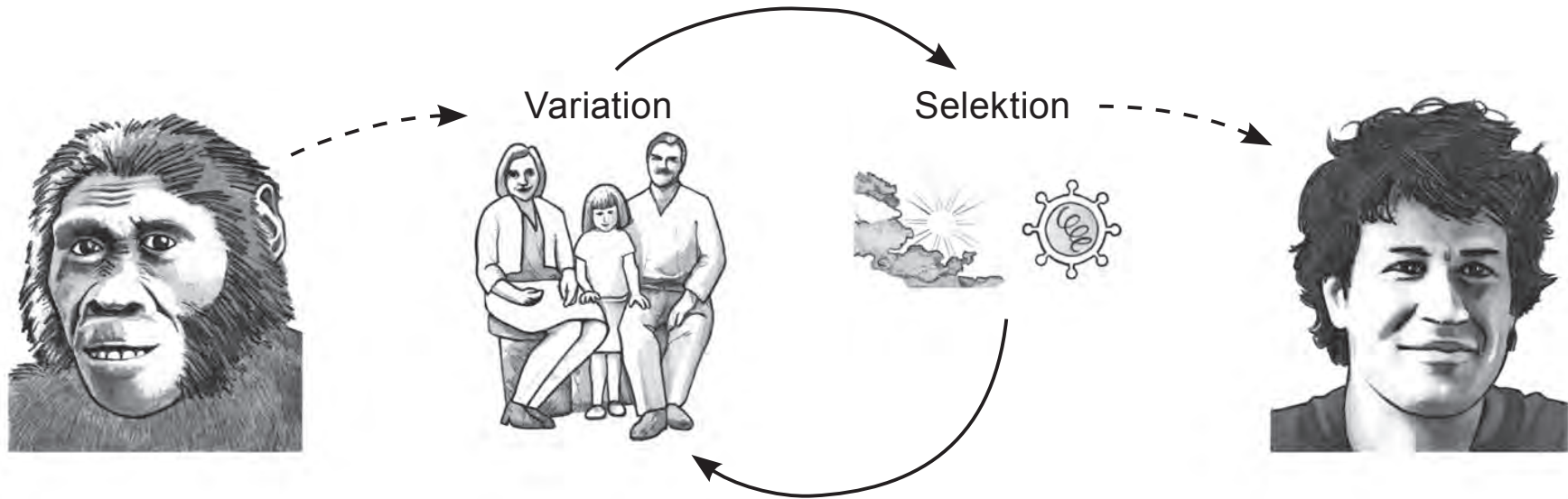


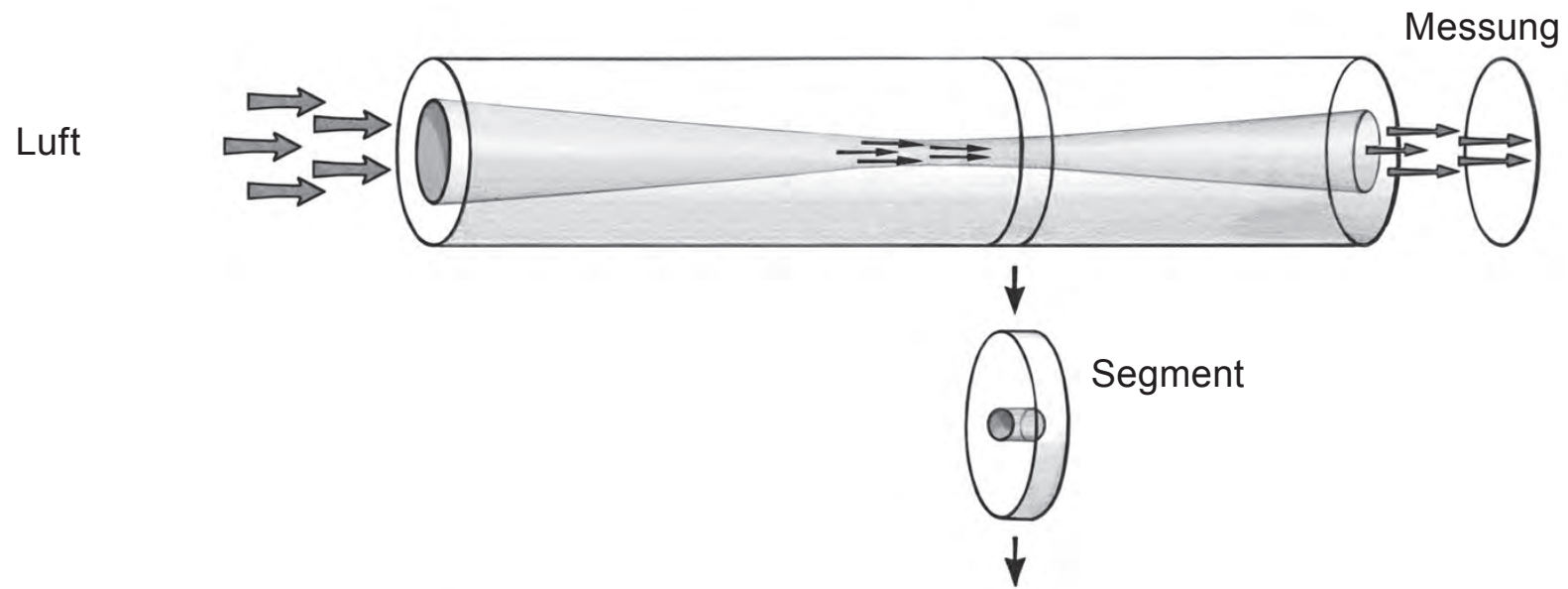
④ zusammensetzen



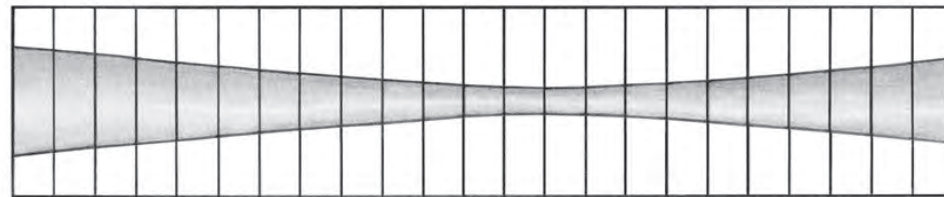
Supercomputer

TGCC
TGATG CCTCAA
ACCTGATGCCAATCCTCAA
↑ ↑
ACCTGATG CCAATCC



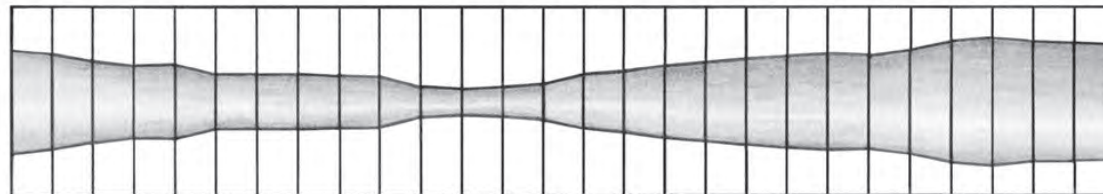


Start



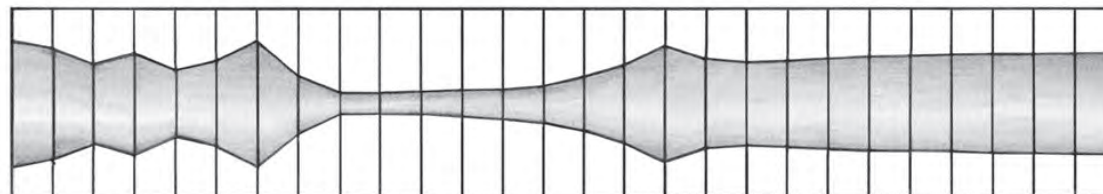
⋮

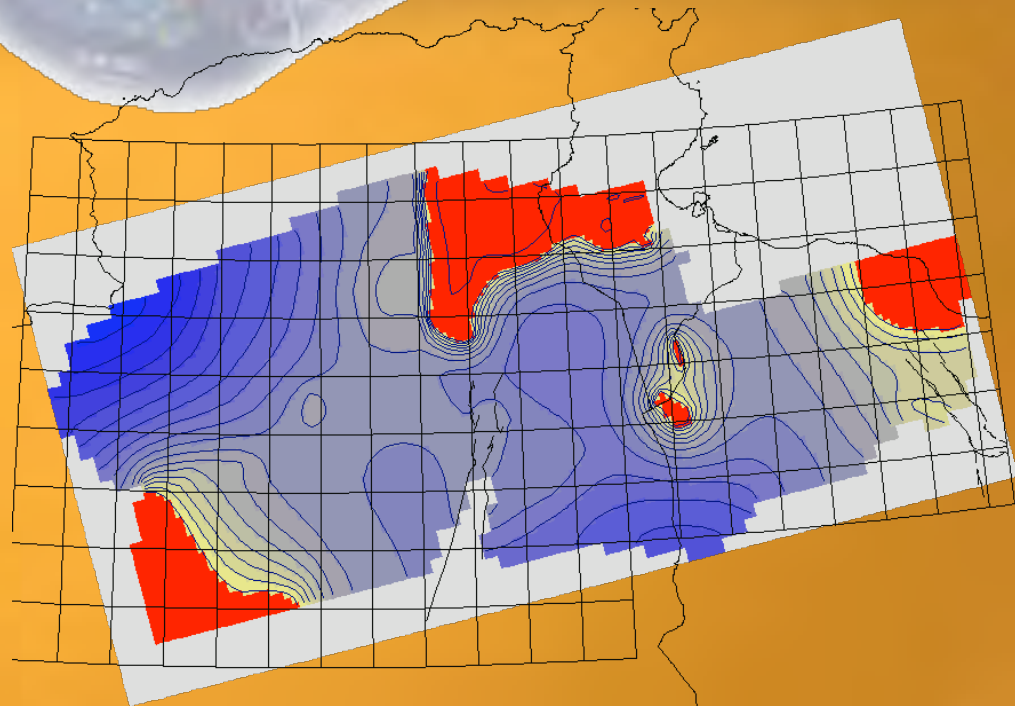
24. Verbesserung

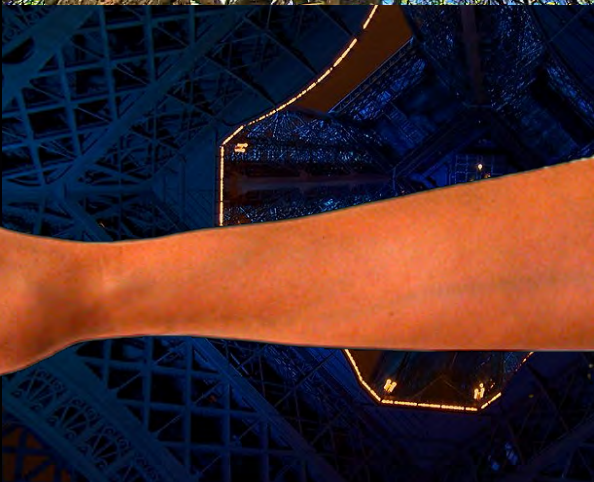
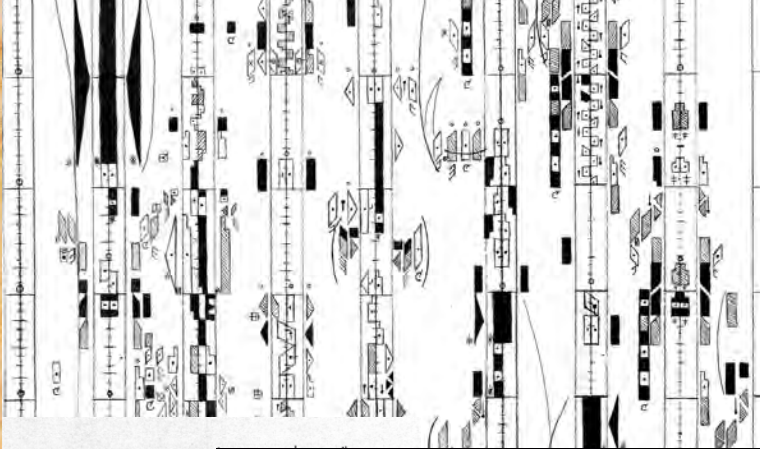


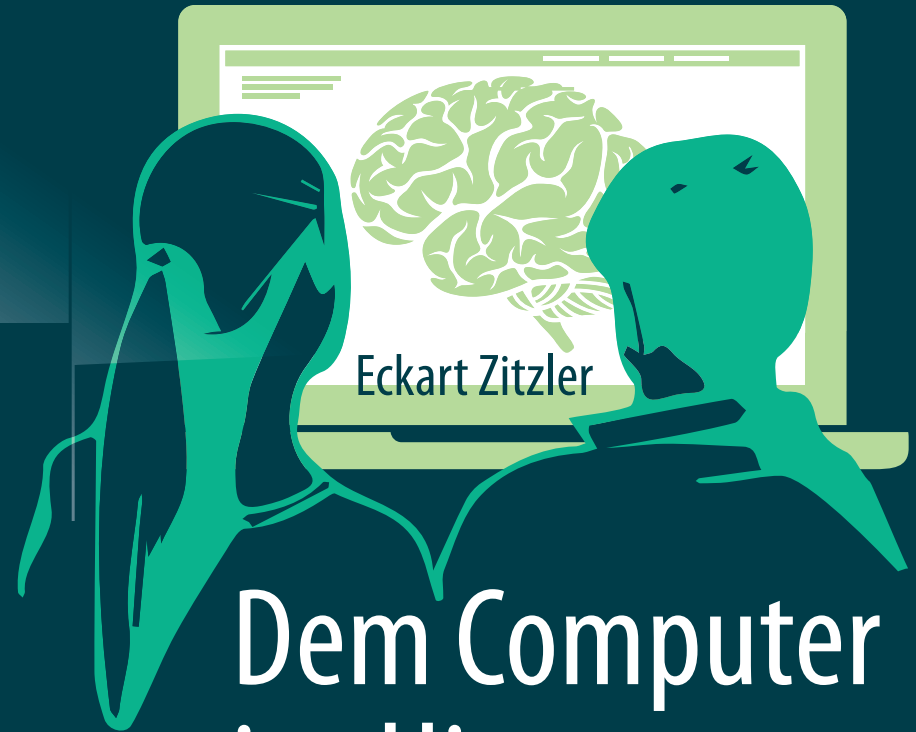
⋮

45. Verbesserung









Dem Computer ins Hirn geschaut

Informatik entdecken, verstehen
und querdenken

EBOOK INSIDE

 Springer